

## WHAT IS CLAIMED IS:

1. A dynamic control diffraction grating comprising a voltage-dependent phase varying material for transmitting a beam of light therethrough and varying the phase of the transmitted light beam in response to external voltages applied thereto, said voltages having different levels and being applied to said phase varying material at regular intervals in a comb form.

10

2. A dynamic control diffraction grating as set forth in Claim 1, wherein said voltage-dependent phase varying material is liquid crystal.

15

3. A dynamic control diffraction grating as set forth in Claim 1, wherein said voltage-dependent phase varying material is a refractive index varying material for varying said phase of said transmitted light beam with a variation in its refractive index responsive to said first and second voltages.

20

4. A dynamic control diffraction grating as set forth in Claim 3, wherein said refractive index varying material is lithium niobate.

25

5. A dynamic control diffraction grating comprising:

a voltage-dependent phase varying material for transmitting a beam of light therethrough and varying the phase of the transmitted light beam in response to first and second voltages applied thereto;

5 a first transparent electrode attached to one inner surface of a flat glass panel for applying said first voltage to said phase varying material, said glass panel containing said phase varying material, said first transparent electrode including a plurality of combs arranged at regular intervals;  
10 and

a second transparent electrode attached to the other inner surface of said glass panel for applying said second voltage to said phase varying material, said second transparent electrode including a plurality of combs arranged  
15 at regular intervals.

6. A dynamic control diffraction grating as set forth in Claim 5, wherein said voltage-dependent phase varying material is liquid crystal.  
20

7. A dynamic control diffraction grating as set forth in Claim 5, wherein said voltage-dependent phase varying material is a refractive index varying material for varying said phase of said transmitted light beam with a variation in its  
25 refractive index responsive to said first and second voltages.

8. A dynamic control diffraction grating as set forth in Claim 7, wherein said refractive index varying material is lithium niobate.

5

9. An information read/write apparatus using a three-beam method for separating a beam of light emitted from a light source into a main beam of light and two sub-beams of light, driving a tracking servo of said main light beam on a recording medium using said two sub light beams and performing read and write modes of said recording medium using said main beam, said apparatus comprising:

a dynamic control diffraction grating having a voltage-dependent phase varying material for transmitting said beam of light emitted from said light source therethrough and varying the phase of the transmitted light beam in response to first and second voltages applied thereto, thereby diffracting said transmitted light beam to generate said main beam of light and two sub-beams of light, said first and second voltages having different levels and being applied to said phase varying material at regular intervals in a comb form; and

supply voltage setting means for setting said levels of said first and second voltages such that a light amount ratio of said main light beam to said sub light beams is greater in said write mode than said read mode.

10. An information read/write apparatus as set forth in Claim 9, wherein said voltage-dependent phase varying material is liquid crystal.

5 11. An information read/write apparatus as set forth in Claim 9, wherein said voltage-dependent phase varying material is lithium niobate.

12. An information read/write apparatus using a three-  
10 beam method for separating a beam of light emitted from a light source into a main beam of light and two sub-beams of light, driving a tracking servo of said main light beam on a recording medium using said two sub light beams and performing read and write modes of said recording medium using said main  
15 beam, said apparatus comprising:

a dynamic control diffraction grating for separating said beam of light emitted from said light source into said main beam of light and two sub-beams of light, said main light beam being a zero-order diffracted beam of light, said sub light  
20 beams being first-order diffracted beams of light, said dynamic control diffraction grating including a voltage-dependent phase varying material for transmitting said beam of light emitted from said light source therethrough and varying the phase of the transmitted light beam in response to first  
25 and second voltages applied thereto, a first transparent

electrode attached to one inner surface of a flat glass panel  
for applying said first voltage to said phase varying  
material, said glass panel containing said phase varying  
material, said first transparent electrode including a  
5 plurality of combs arranged at regular intervals, and a second  
transparent electrode attached to the other inner surface of  
said glass panel for applying said second voltage to said  
phase varying material, said second transparent electrode  
including a plurality of combs arranged at regular intervals;  
10 and

supply voltage setting means for setting said levels of  
said first and second voltages such that a light amount ratio  
of said main light beam to said sub light beams is greater in  
said write mode than said read mode.

15

13. An information read/write apparatus as set forth in  
Claim 12, wherein said voltage-dependent phase varying  
material is liquid crystal.

20

14. An information read/write apparatus as set forth in  
Claim 12, wherein said voltage-dependent phase varying  
material is lithium niobate.

15. An information read/write apparatus for performing a  
25 tracking servo operation and read and write modes of a

recording medium using a one-beam method, separating a beam of light emitted from a light source into a main beam of light and two sub-beams of light in said read mode, reading information from adjacent tracks of said recording medium  
5 using said two sub-beams of light, reading information from a main track of said recording medium using said main light beam and controlling crosstalks contained in said information read from said main track using said information read from said adjacent tracks, said apparatus comprising:

10 a dynamic control diffraction grating having a voltage-dependent phase varying material for transmitting said beam of light emitted from said light source therethrough and varying the phase of the transmitted light beam in response to first and second voltages applied thereto, thereby diffracting said  
15 transmitted light beam to generate said main beam of light and two sub-beams of light, said first and second voltages having different levels and being applied to said phase varying material at regular intervals in a comb form; and

supply voltage setting means for setting said levels of  
20 said first and second voltages such that said sub light beams cannot be generated in said write mode and can be generated in predetermined intensity ratios to said main beam in said read mode.

25 16. An information read/write apparatus as set forth in

Claim 15, wherein said voltage-dependent phase varying material is liquid crystal.

17. An information read/write apparatus as set forth in  
5 Claim 15, wherein said voltage-dependent phase varying material is lithium niobate.

18. An information read/write apparatus for performing a tracking servo operation and read and write modes of a  
10 recording medium using a one-beam method, separating a beam of light emitted from a light source into a main beam of light and two sub-beams of light in said read mode, reading information from adjacent tracks of said recording medium using said two sub-beams of light, reading information from a  
15 main track of said recording medium using said main light beam and controlling crosstalks contained in said information read from said main track using said information read from said adjacent tracks, said apparatus comprising:

a dynamic control diffraction grating for separating said  
20 beam of light emitted from said light source into said main beam of light and two sub-beams of light, said main light beam being a zero-order diffracted beam of light, said sub light beams being first-order diffracted beams of light, said dynamic control diffraction grating including a voltage-  
25 dependent phase varying material for transmitting said beam of

light emitted from said light source therethrough and varying the phase of the transmitted light beam in response to first and second voltages applied thereto, a first transparent electrode attached to one inner surface of a flat glass panel  
5 for applying said first voltage to said phase varying material, said glass panel containing said phase varying material, said first transparent electrode including a plurality of combs arranged at regular intervals, and a second transparent electrode attached to the other inner surface of  
10 said glass panel for applying said second voltage to said phase varying material, said second transparent electrode including a plurality of combs arranged at regular intervals; and

supply voltage setting means for setting said levels of  
15 said first and second voltages such that said sub light beams cannot be generated in said write mode and can be generated in predetermined intensity ratios to said main beam in said read mode.

20 19. An information read/write apparatus as set forth in Claim 18, wherein said voltage-dependent phase varying material is liquid crystal.

25 20. An information read/write apparatus as set forth in Claim 18, wherein said voltage-dependent phase varying



material is lithium niobate.

21. An information read apparatus for separating a beam of light emitted from a light source into a main beam of light  
5 and two sub-beams of light, reading information from adjacent tracks of a recording medium using said two sub-beams of light, reading information from a main track of said recording medium using said main light beam and controlling crosstalks contained in said information read from said main track using  
10 said information read from said adjacent tracks, said apparatus comprising:

a dynamic control diffraction grating having a voltage-dependent phase varying material for transmitting said beam of light emitted from said light source therethrough and varying  
15 the phase of the transmitted light beam in response to first and second voltages applied thereto, thereby diffracting said transmitted light beam to generate said main beam of light and two sub-beams of light, said first and second voltages having different levels and being applied to said phase varying  
20 material at regular intervals in a comb form; and

supply voltage setting means for supplying said first and second voltages to said dynamic control diffraction grating.

22. An information read apparatus as set forth in Claim  
25 21, wherein said voltage-dependent phase varying material is

liquid crystal.

23. An information read apparatus as set forth in Claim 21, wherein said voltage-dependent phase varying material is  
5 lithium niobate.

24. An information read apparatus for separating a beam of light emitted from a light source into a main beam of light and two sub-beams of light, reading information from adjacent  
10 tracks of a recording medium using said two sub-beams of light, reading information from a main track of said recording medium using said main light beam and controlling crosstalks contained in said information read from said main track using  
said information read from said adjacent tracks, said  
15 apparatus comprising:

a dynamic control diffraction grating for separating said beam of light emitted from said light source into said main beam of light and two sub-beams of light, said main light beam being a zero-order diffracted beam of light, said sub light  
20 beams being first-order diffracted beams of light, said dynamic control diffraction grating including a voltage-dependent phase varying material for transmitting said beam of light emitted from said light source therethrough and varying the phase of the transmitted light beam in response to first  
25 and second voltages applied thereto, a first transparent

electrode attached to one inner surface of a flat glass panel  
for applying said first voltage to said phase varying  
material, said glass panel containing said phase varying  
material, said first transparent electrode including a  
5 plurality of combs arranged at regular intervals, and a second  
transparent electrode attached to the other inner surface of  
said glass panel for applying said second voltage to said  
phase varying material, said second transparent electrode  
including a plurality of combs arranged at regular intervals;  
10 and

supply voltage setting means for supplying said first and  
second voltages to said dynamic control diffraction grating.

25. An information read apparatus as set forth in Claim  
15 24, wherein said voltage-dependent phase varying material is  
liquid crystal.

26. An information read apparatus as set forth in Claim  
24, wherein said voltage-dependent phase varying material is  
20 lithium niobate.